Remarks

The present amendment responds to the Official Action dated June 29, 2004. This amendment is accompanied by a petition and fee for a one month extension of the deadline for response to the Official Action. The Official Action rejected claims 1-25 under 35 U.S.C. §101, as being directed to non-statutory subject matter in that the claims do not recite that the computation is performed by a computer with memory. Claim 1 was rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicants regard as the invention. Specifically, the terms "data" and "a hat function model" were asserted to be "vague and indefinite" in claims 1 and 17, respectively. Claims 1-38 were rejected under 35 U.S.C. §102(b) and 35 U.S.C. §103 as anticipated or obvious over Ciochetti et al., *A Proportional Hazards Model of Commercial Mortgage Default with Originator Bias*, document showing a date of "March 2001" ("Ciochetti"). The Official Action included a requirement for information under 37 C.F.R. § 1.105. These grounds of rejection and the requirement for information are addressed below following a brief discussion of the present invention to provide context. Claims 1, 12, 17, 23, 30 and 36 have been amended to be more clear and distinct. New claim 39 has been added. Claims 1-39 are presently pending.

The Invention

The present invention provides improved methods for providing an indication of risk or predicting an indicator of risk of a mortgage loan contemporaneously with origination of the

loan. The methods comprise steps of receiving or determining mortgage loan data, analyzing the data utilizing a proportional hazards model or a hat function model or both, and computing the indication or indicator of risk. The present invention also provides systems for predicting a default probability of a mortgage loan contemporaneously with origination of the loan. The systems utilize a proportional hazards model, a hat function model, or in one embodiment a hat function model and a proportional hazards model in combination.

More particularly, in one embodiment according to the present invention, a method is provided for providing an indication of risk of a loan contemporaneously with origination of the loan. The method comprises steps of receiving mortgage loan data for an applicant for a loan, analyzing the data utilizing a proportional hazards model, computing the indication of risk for the loan using a computer with memory, and transmitting the computed default probability for the loan. The mortgage loan data includes data regarding occurrence of an event relevant to the loan and also time to the event. The analysis of the data utilizing a proportional hazards model takes into consideration not only the occurrence of the event relevant to the loan, but also the time to the event.

In another embodiment according to the present invention, a method is provided for predicting an indicator of the risk of a loan contemporaneously with origination of the loan. The method comprises the steps of receiving mortgage loan data for an applicant for a loan, analyzing the received data utilizing a hat function model, computing the indicator of the risk for the loan, and transmitting the indicator of the risk.

In a further embodiment according to the present invention, a method is provided for predicting an indicator of the risk of a loan contemporaneously with origination of the loan. The method comprises the steps of: determining a set of mortgage origination data to be analyzed;

storing the set of mortgage origination data in a database including the substep of storing two components for a subset of the set of mortgage origination data; the two components comprising a binary variable indicating whether an event was observed or not, and a time observed variable; establishing and storing a hat function model for at least one independent variable X to be analyzed in which the independent variable X is mapped to a series of independent variables X_i which meet the constraints $\sum X_i = 1$ and the independent variables X_i are continuous variables over a range [0, 1], and each independent X_i is defined by a fuzzy membership function; receiving a request to compute the indicator of the risk for data for a loan applicant; and computing the indicator of the risk for said data utilizing the proportional hazards model and the hat function model.

In another embodiment according to the present invention, a system is provided for predicting a default probability of a loan contemporaneously with origination of the loan. The system comprises a server receiving mortgage loan data for an applicant for a loan, the server including a programmed processor operable to analyze the data utilizing a software based proportional hazards model, and a communication mechanism to transmit the computed default probability. The server is further operable to compute the default probability for the loan.

In a further embodiment according to the present invention, a system is provided for predicting the default probability of a loan contemporaneously with origination of the loan. The system comprises: a database storing a set of mortgage origination data including two components for a subset of the set of mortgage origination data, the two components comprising a binary variable indicating whether an event was observed or not, and a time observed variable; a memory storing a hat function model for at least one independent variable X to be analyzed in which the independent variable X is mapped to a series of independent variables X_i which meet

the constraints $\Sigma X_i = 1$ and the independent variables X_i are continuous variables over a range [0, 1], and each independent X_i is defined by a fuzzy membership function; an input to receive a request to compute a probability of default for data for a loan applicant; and a programmed computer to automatically compute the probability of default for the data utilizing the proportional hazards model and the hat function model.

In another embodiment according to the present invention, a system is provided for predicting a default probability of a loan contemporaneously with origination of the loan, the system comprising: a server receiving mortgage loan data for an applicant for a loan; the server including a programmed processor operable to analyze the received data utilizing a software based hat function model; the server further operable to compute the default probability for the loan; and a communication mechanism to transmit the computed default probability.

The Rejection Under 35 U.S.C. § 101

Claims 1-25 were rejected under 35 U.S.C. § 101, as being directed to non-statutory subject matter in failing to recite that computations are performed by a computer with memory. This rejection is respectfully traversed in view of the amendments in the claims and the discussion below.

Independent method claim 1 has been amended to recite that the step of computing the indication of risk for the loan is carried out "using a computer with memory". Independent method claim 12 has been amended to recite that the step of computing an indicator of risk for data utilizing a proportional hazards model and a hat function model is carried out "using a computer with memory". Independent method claim 17 has been amended to recite that the step of computing an indicator of risk for a loan is carried out "using a computer with memory".

Accordingly, all of the independent method claims now recite that computations are carried out using a computer with memory. Applicants therefore respectfully request that it now be withdrawn.

Applicants wish the record to be clear that some computations within the scope of these method claims can and may be performed without the use of a computer. Some computations may be performed by automated means other than a computer, or automated means other than a computer with memory, or manually, or mentally. Methods carried out in such manners are wholly within the scope of these claims provided that they meet the other claim limitations.

The Rejections Under 35 U.S.C. § 112

Claims 1 and 17 were rejected under 35 U.S.C. § 112, second paragraph, as failing to particularly point out and distinctly claim the subject matter which Applicants regarded as the invention. In claim 1, "data" was asserted to be vague and indefinite. In claim 17, "a hat function model" was asserted to be vague and indefinite. These rejections are respectfully traversed in view of the amendments in the claims and the discussion below.

Claim 1 has been amended to recite "loan data". "Loan data" defines the data that is analyzed utilizing a proportional hazards model in the method of claim 1. For example, the specification states at page 2 that:

> Unlike standard credit scores which are determined only from credit bureau data, mortgage scores incorporate credit bureau data, but also consider additional data. A mortgage score determined in accordance with the present invention also preferably reflects mortgage information, such as property data, loan-to-value (LTV) ratio, and loan

type; market data, such as unemployment rate, housing inventory, and the like; and collateral forecasts, as addressed in greater detail below. Specification, page 2.

Further exemplary data that may be included comprises product data, appraisal data, borrower data, borrower income, servicing data, collateral data, economic data, mortgage origination data, and mortgage loan default data. Specification, pp. 4-6 and 16.

Claim 1 has further been amended to recite that the mortgage loan data includes "data regarding occurrence of an event relevant to the loan and also time to the event". Claim 1 has additionally been amended to recite that the step of analyzing the data utilizing a proportional hazards model takes "into consideration not only the occurrence of an event relevant to the loan, but also the time to the event".

Claim 17 recites "analyzing the received data utilizing a hat function model". Hat function models are described clearly and in detail in the specification. For example, at page 11, the specification states:

> Hat functions allow nonlinear effects to be modeled in a continuous fashion rather than using step functions. Hat functions are similar to using a series of binary variables in the sense that the independent variable X is mapped to a series of independent variables X_i which meet the constraint $\Sigma X_i = 1$. There are, however, at least two fundamental differences: (1) The X_i are no longer binary variables, but are continuous variables over [0,1], (2) the subsets over which the X_i are defined are not disjoint. Each X_i is defined by a fuzzy membership function. X_i is a fuzzy number, with its value defined by a measure of distance from the number. Hat functions use a linear decay to define the distance from

the number which also is called the "degree of membership". See also, specification pages 12, 13, and 15-18; and Figs. 5-8, 10 and 11.

The Rejections Under 35 U.S.C. § 102(b) and 35 U.S.C. § 103(a)

Claims 1-38 were rejected under 35 U.S.C. § 102(b) as anticipated by Ciochetti. Claims 1-38 were rejected under 35 U.S.C. § 103(a), apparently as obvious over Ciochetti. Applicants respectfully traverse these rejections and request that they now be withdrawn, in view of the present amendment and the discussion below.

Ciochetti is a manuscript carrying a date of "March 2001" on its cover. March 2001 is too late a date for Ciochetti to constitute a prior art reference against the subject patent application, which was filed on September 27, 2000. Moreover, there is no copyright notice or other indication that the "March 2001" date is in fact a publication date. The effective publication date of Ciochetti, if any, therefore has not been established. Attached is a copy of the resume of Rui Yao, one of the listed authors in Ciochetti, which was found on the Internet in an effort to better understand the origination of Ciochetti. This resume indicates on page 2 that a paper having the same title and same authorship with the addition of one further author, was published in 2003. This resume further indicates that a conference having the same title occurred in January, 2001, which is also too late for any disclosure then occurring to be effective prior art.

A reference is proven to be a printed publication "upon a satisfactory showing that such document has been disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art, exercising reasonable diligence, can locate it." *In re Wyer*, 655 F.2d 221, 210 USPQ 790 (CCPA 1981) (quoting *I.C.E. Corp. v. Armco Steel Corp.*, 250 F. Supp. 738, 743, 148 USPQ 537, 540 (S.D.N.Y. 1966)). *See also,*

Carella v. Starlight Archery, 804 F.2d 135, 231 USPQ 644 (Fed. Cir. 1986). The Court in *In re Wyer* further stated, 655 F.2d 221, 227, 210 USPQ 790, 795 (CCPA 1981), that "The one who wishes to characterize the information, in whatever form it may be, as a 'printed publication' ...should produce sufficient proof of its dissemination or that it has otherwise been available and accessible to persons concerned with the art to which the document relates and thus most likely to avail themselves of its contents." The Manual of Patent Examining Procedure states, in section 2128.01, that "[i]f the publication does not include a publication date (or retrieval date), it cannot be relied upon as prior art under 35 U.S.C. 102(a) or (b)." Ciochetti has not been proven to be a publication, and in any event its March 2001 date is too late for Ciochetti to be effective prior art. Therefore, contrary to the assertion on page 3 of the Official Action, Ciochetti does not anticipate and does not render obvious the claimed invention. An Information Disclosure Statement ("IDS") is submitted herewith regarding certain information discovered in the course of Applicants' on line investigation of Ciochetti.

Ciochetti is cited for its purported confirmation of the availability of other information elsewhere prior to September 27, 2000, such other information allegedly constituting prior art. Ciochetti generally states on page 6 that "A number of previous studies have used proportional hazards models to investigate the determinants of commercial mortgage defaults. These studies include Vandell et al. (1993), Follain and Ondrich (1997), and Pavlov (1999)." Applicants do not have copies of any of these cited, purported publications, and Applicants do not have any information regarding what they disclose. The bibliography of Ciochetti further cites various purported publications stated to have relevance to proportional hazard models. Applicants do not have copies of any of these cited, purported publications, nor do Applicants have any information regarding what they disclose. Contrary to the assertion on page 3 of the Official

Action, Ciochetti does not attest to the "fact the invention was in use prior to 2000." Accordingly, contrary to the further assertion at page 3 of the Official Action, no public use activity issue has been raised.

The Requirement for Information Under 37 CFR 1.105

The Official Action included a requirement to provide the following information:

1. Title, citation and copy of each publication that any of the Applicants relied upon to develop the disclosed subject matter that describes the Applicants' invention, particularly as to developing the proportional hazards model.

2. For each such publication, a concise explanation of the reliance placed on that publication in the development of the disclosed subject matter.

3. Copies of each publication which any of the Applicants authored or co-authored and which describes the disclosed subject matter of Proportional Hazards Models.

Pursuant to 37 CFR 1.105, counsel for Applicants has asked each of the two inventors to identify and provide any information called for as summarized above. As to item (1), the attached IDS identifies *SAS Technical Report P-229*, V.6.07, pp. 435-479; *Survival Analysis, Techniques for Censored and Truncated Data*, John P. Klein and Melvin L. Moeschberger (1997); *Counting Processes & Survival Analysis*, Thomas R. Fleming and David P. Harrington (1991); and *Survival Analysis, A Practical Approach*, Mahesh K.B. Parmar and David Machin

(1995). The latter three citations are reference books of general background relevance that were consulted. No portions of these three books have been identified as being of particular relevance to the present invention, and copies therefore are not being provided. Copies of the cited pages of *SAS Technical Report P-229*, V.6.07 are attached to the accompanying Supplemental Information Disclosure Statement.

As to item (2), each of the cited documents were used as general references regarding the theory, mathematics and computer programming for proportional hazards models. As to item (3), Mr. Matt Palmgren confirmed that there are no such publications having a publication date on or before September 27, 2000. Applicants respectfully traverse this requirement for information to the extent that it deviates from the express provisions of 37 CFR 1.105.

Conclusion

All of the presently pending claims, as amended, appearing to define over the applied references, withdrawal of the present rejections and prompt allowance are requested.

Respectfully submitted,

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